ESTIMATING ABUNDANCE OF SANDEELS ON THE DOGGER BANK USING ACOUSTICS AND DREDGES

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Estimates of sandeel biomass from complementary methodologies reveal changes in apparent stock size due to sandeel behaviour

Rationale and aim

Between 700,000 and a million tonnes of sandeels (*Ammodytes marinus*) are landed each year from the North Sea. Sandeel stocks are currently assessed at a coarse spatial scale using landings and effort data. Development of effective fisheries-independent sampling methods for sandeels is key to understanding spatio-temporal variability in sandeel distribution and abundance. The aim was to develop a survey method that can provide tuning data to improve stock assessments.

Methods and Results

Acoustics and a modified scallop dredge were used to sample sandeels within a 27nm by 30nm area of the Dogger Bank in 2000 and 2001. The effect of variability in acoustic backscatter, reference target strength and sandeel mean length was simulated to derive a range of estimates of acoustic biomass (Figure 1, 2a). By constraining the biomass estimate from the dredge survey to equal that derived from the acoustic survey, we back-calculated estimates of dredge efficiency (Figure 1, 2b). These estimates compare well with published values of scallop dredge efficiency [1, 2]. Estimates of acoustic biomass and dredge efficiency were most sensitive to the assumptions of variability in reference target strength (Figure 3).

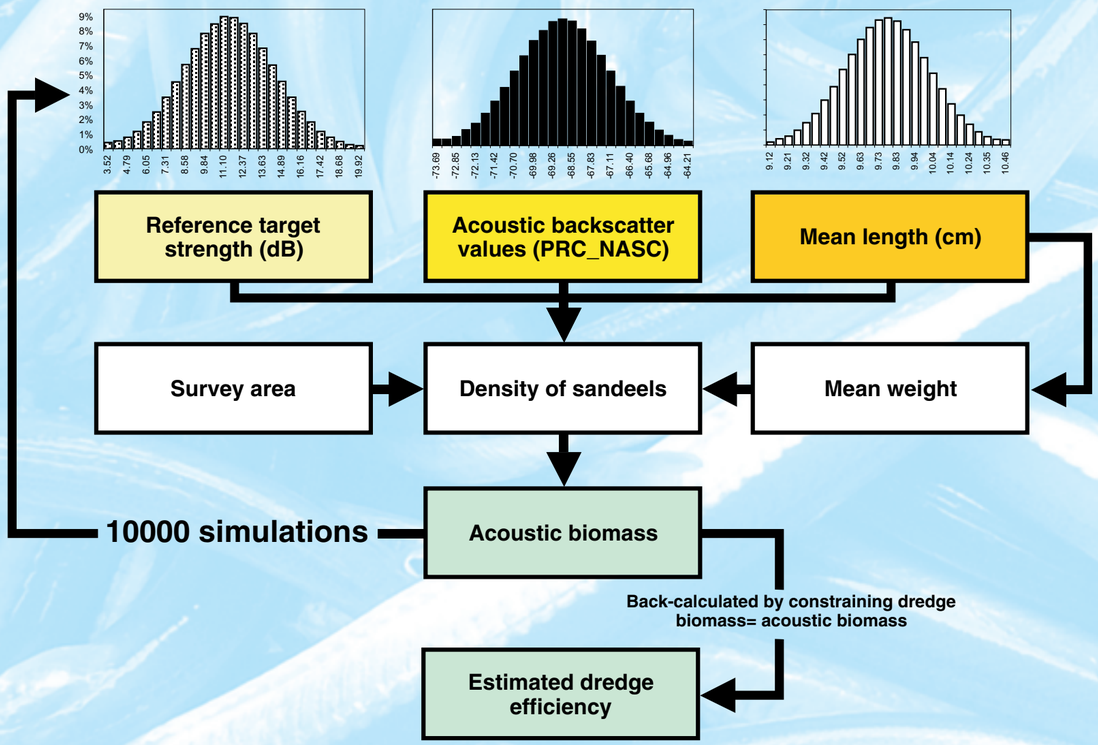

Figure 1: Calculating estimated sandeel biomass and dredge efficiency. Sources of error in acoustic estimation were taken from Simmonds et al. (1992). [3]

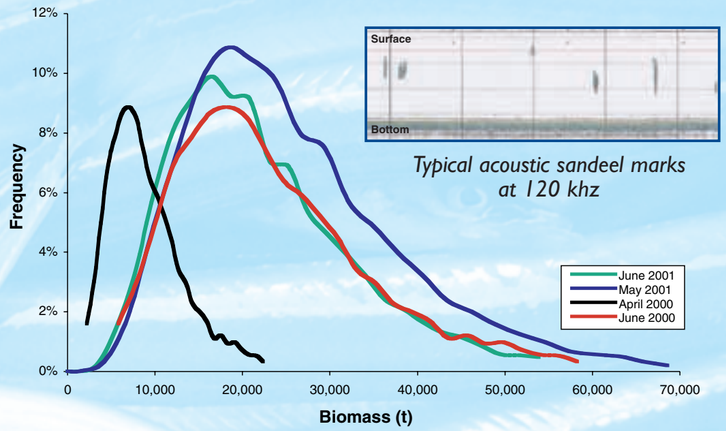

Figure 2a: Sandeel biomass estimates from acoustic data.

Sandeel dredge

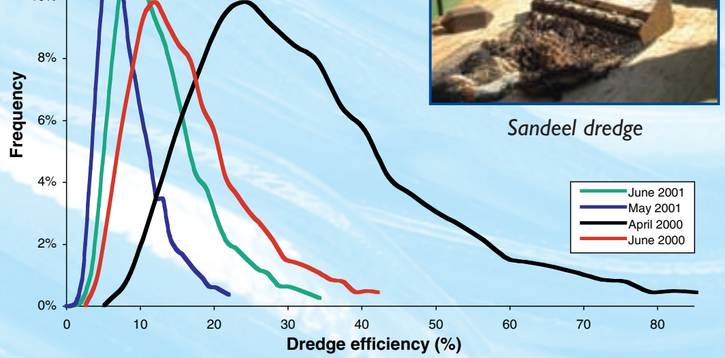

Figure 2b: Dredge efficiency estimates from acoustic biomass.

Conclusions

- Complementary methodologies for assessing sandeel biomass show promise for improving sandeel assessments
- Estimated dredge efficiency in April 2000 suggests that a higher proportion of sandeels were present in the sediment and were more readily caught than during other surveys
- Knowledge of fish behaviour and other sources of variability are crucially important in the interpretation of acoustic abundance data

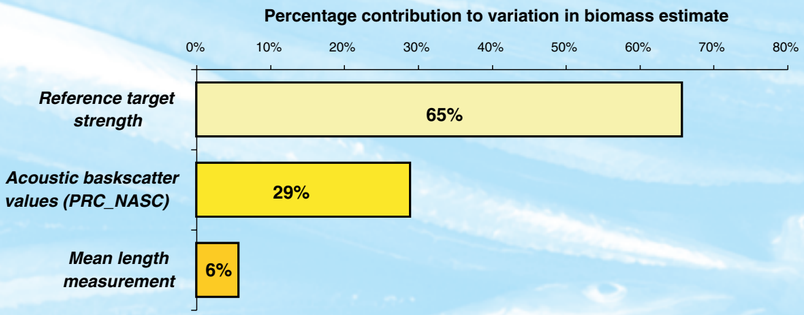

Figure 3: Sensitivity of acoustic biomass to key sources of variability

References

1. Dare, PJ; Key, D & Connor, PM. 1993. The efficiency of spring-loaded dredges used in the Western English Channel fishery for scallops, *Pecten maximus*. ICES (FISH CAPTURE COMMITTEE) CM 1993/B:15 (REF. K).
2. Zhang, CI; Ault, JS & Endo, S. 1993. Estimation of dredge sampling efficiency for blue crabs in Chesapeake Bay. BULL. KOREAN. FISH. SOC., 26, 369 - 379
3. Simmonds, E.J., Williamson, N.J., Gerlotto, F., and Aglen, A. 1992. Acoustic survey design and analysis procedure: a comprehensive review of current practice. ICES Cooperative Research Report, No. 187.

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